

## CLAIMS

What is claimed is:

1. A distillation system for recovering acetic acid from water during terephthalic acid production comprising:
  - a dehydration column having an overhead section;
  - at least one input feed stream containing acetic acid and water;
  - an entrainer; and
  - a condenser to separate the acetic acid from water.
2. The distillation system according to claim 1 wherein the dehydration column is an azeotropic dehydration column.
3. The distillation system according to claim 1 wherein the dehydration column an output bottom stream and an output overhead stream.
4. The distillation system according to claim 3 wherein the output bottom stream has a higher acetic acid concentration than the at least one input feed stream.
5. The distillation system according to claim 3 wherein the output overhead stream has a lower dilute acetic acid concentration than the at least one input feed stream.

6. The distillation system according to claim 1 wherein the condenser condenses a vapor from the overhead of the dehydration column to generate a low pressure steam.
7. The distillation system according to claim 6 wherein the low pressure steam generated has a pressure of at least  $0.6 \text{ kg/cm}^2$  abs.
8. The distillation system according to claim 6 wherein the low pressure steam generated has a pressure from  $0.7 \text{ kg/cm}^2$  abs to  $2.0 \text{ kg/cm}^2$  abs.
9. The distillation system according to claim 1 wherein the entrainer is N-butyl acetate.
10. The distillation system according to claim 1 wherein the entrainer is I-butyl acetate.
11. The distillation system according to claim 1 wherein the entrainer is a mixture of N-butyl acetate and I-butyl acetate.
12. The distillation system according to claim 1 wherein the distillation column has an overhead pressure of at least  $1.2 \text{ kg/cm}^2$  abs.
13. The distillation system according to claim 1 wherein the distillation column has an overhead pressure greater than  $1.2 \text{ kg/cm}^2$  abs.

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14. A distillation method for recovering acetic acid from water during the production of terephthalic acid, the method comprising;
- providing an input feed stream of water containing acetic acid;
  - distilling the input feed stream in an azeotropic dehydration column having an overhead section into a vapor stream;
  - entraining the vapor;
  - condensing the vapor stream to separate acetic acid from water; and
  - outputting a bottom stream having a higher acetic acid concentration than the input feed stream and an output overhead stream having a more dilute acetic acid concentration than the input feed stream.
15. The distillation method according to claim 14 wherein the entraining step uses N-butyl acetate.
16. The distillation method according to claim 14 wherein the entraining step uses I-butyl acetate.
17. The distillation method according to claim 14 wherein the entraining step uses a mixture of N-butyl acetate and I-butyl acetate.
18. The distillation method according to claim 14 wherein the condensing step generates a low pressure steam.
19. The distillation method according to claim 18 wherein the low pressure steam is at least  $0.6 \text{ kg/cm}^2 \text{ abs.}$

20. The distillation method according to claim 18 wherein the low pressure steam is from 0.7 kg/cm<sup>2</sup> abs to 2.0 kg/cm<sup>2</sup> abs.
21. The distillation method according to claim 14 wherein the distilling step has an overhead pressure of at least 1.2 kg/cm<sup>2</sup> abs.
22. The distillation method according to claim 14 wherein the distilling step has an overhead pressure of greater than 1.2 kg/cm<sup>2</sup> abs.

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